PATENT ABSTRACTS OF JAPAN

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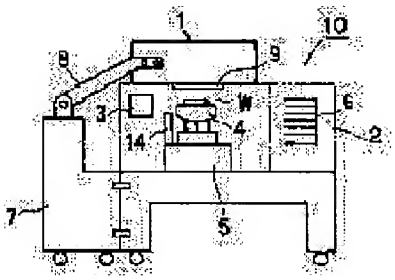
(54) PROBING APPARATUS

(57)Abstract:

PURPOSE: To obtain a probing apparatus wherein an object to be treated can be aligned with a test head in a measuring operation and a high-frequency measurement can be performed with high accuracy.

CONSTITUTION: A probe card 9 which is provided with a probe needle is attaches directly to a test Mac 1; a detection means 14 which detects the inclination of the probe card 9 with reference to a mounting stand 4 is attaches to the mounting stand 4 which supports an object under test; a correction means which corrects the inclination of the mounting stand 4 on the basis of information from the detection means 14 is installed. The correction means is composer of three support parts which support the mounting stand 4 and whose length can be changed. By charging the length of each support part, the inclination of the mounting stand 4 is corrected. Thereby, since the probe card can be attached directly to the test head, the connecting part such as a measuring cable or the like between the test head and the probe card can be eliminated, an increase in the impedance of the title apparatus can be eliminated and a high-frequency measurement can be performed accurately.



CLAIMS

[Claim(s)]
[Claim 1]A test head.
A probe card which is provided with a probe needle for inspecting an inspected object, and is electrically connected to said test head.
A support means which supports said inspected object.
A stage for moving said support means so that said inspected object and said probe needle may contact.
It is the probe device provided with the above, and said support means was provided with a compensation means which amends inclination to said test head of said inspected object.

[Claim 2]The probe device according to claim 1, wherein said probe card is connected with said test head fixed.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application]This invention relates to the probe device for inspecting the electrical property of inspected objects, such as a semiconductor wafer.
[0002]
[Description of the Prior Art]Two or more chips regularly arranged with the constant interval are formed in the surface of an inspected object, for example, an inspected object, and two or more pads which stand in a row in various kinds of signals in this chip are formed in the predetermined part in each chip. Where the probe needle of correspondence of test equipment in each pad in a chip is contacted, the inspection of the electrical property of this chip is conducted, and discernment by marking etc. is performed to a defective chip. Usually, in order that this main test equipment may attain automation of an inspection, a probe device is put together.
[0003]As this probe device 100 is shown in drawing 6, while arranging the probe card 102 provided with the probe needle arranged at the upper part side of the wafer mounting pedestal 101 movable in X, Y, Z, and the direction of theta corresponding to the electrode pad arrangement of the IC chip in a wafer, Fix this probe card 102 to the undersurface of the contact ring 103 with a screw, and the contact ring 103 and a probe card are electrically connected via the pogo pine of a major ring cable or the contact ring 103, This contact ring is fixed by the fixing means which is not illustrated to the insert ring 104 of the main part of a probe device, and it is constituted. And the probe test in such a device, Press the test head 105 against the upper surface of the contact ring 103, and the test head 105 and the contact ring 103 are electrically connected by the major ring cable or a pogo pine, The wafer mounting pedestal 101 is raised, a probe needle and the electrode pad of the chip in a wafer are contacted, and he performs electric measurement in this state, and is trying to judge the quality of an IC chip.
[0004]Furthermore, these days, the multi probe measured at once with the probe card provided with plurality, for example, the probe needle corresponding to these IC chips for the IC chip of 16, for improvement in an operating ratio is also performed.
[0005]
[Problem(s) to be Solved by the Invention]By the way, in such a conventional probe device, Since two or more terminal areas which called it the major ring cable or the pogo pine intervene between the IC chip and test head which are inspected objects, capacity and impedance increase and there is a problem that the high frequency inspection of not less than 200-300 MHz cannot be conducted correctly. There is a problem that it is difficult to take matching with an IC chip and the test head 105, and measurement is not stabilized easily.
[0006]For this reason, a probe card is directly fixed to a test head, and it can be considered that things make a terminal area into the minimum. However, since it is generally on the stand where a test head and the main part of a probe device are separate respectively and those levels differ, when a probe card is directly fixed to a test head. Since perfect contact cannot be aimed at even if it carries out alignment of the probe needle to an IC chip, the adjustment which coincides the level surface of a probe card and the level surface of a wafer is needed.
[0007]Although it acts to the field and wafer mounting pedestal in which a probe card is attached at the time of the assembly of a device as water Hiraide also in the conventional probe device and work is done, In this case, for example, the multi probe with which the accuracy whose levelness is several

10 microns measures two or more chips at once again in the single probe which measures one chip requires the accuracy of **** of a single. However, since the test head can also be 300–500 kg in not less than 200 kg and especially the test head for major–diameter wafers that high integration followed and the test head moreover is not supported by the rigid support means, If there is vibration, even if a possibility of producing a position gap will be large and will perform water Hiraide ** highly precise at the time of an assembly, desired accuracy may be unable to be attained at the time of measurement.

[0008]

[Objects of the Invention]This invention was made that the above problems should be solved and an object of this invention is to provide the probe device in which the alignment of a processed object to a test head is possible at the time of measurement. By attaching a probe card to a test head directly, an object of this invention is to make a terminal area into the minimum and to raise the accuracy of high–frequency measurement.

[0009]

[Means for Solving the Problem]A probe device of this invention which attains such a purpose, A test head and a probe card which is provided with a probe needle for inspecting an inspected object, and is electrically connected to a test head, In a probe device provided with a support means which supports an inspected object, and a stage for moving a support means so that an inspected object and a probe needle may contact, A support means is provided with a compensation means which amends inclination to a test head of said inspected object, and a probe card is suitably connected with a test head fixed.

[0010]

[Function]A support means is moved by movement of a stage and an inspected object and the probe card attached to the test head are made to counter. While the compensation means provided in the support means here detects the inclination of an inspected object to a probe card, the inclination of an inspected object is amended so that a probe card and an inspected object may become parallel. YX drive of a support means and movement of a Z direction by movement of a stage are performed after an appropriate time with a conventional method, a probe needle is contacted on an inspected object, voltage is impressed to a predetermined pad by a test head, and an electrical property is measured.

[0011]

[Example]Hereafter, one example of the probe device of this invention is described with reference to drawings. Drawing 1 is a figure showing the whole probe device of this invention, and comprises the test head 1 mainly supported by buck 7 with another main part 10 of a probe device and main part. The cassette 6 by which the main part 10 of a probe device stores two or more semiconductor wafer W as an inspected object is laid, theta axis is doubled so that the orthogonality of the automatic–loader–and–unloader part 2 for performing taking out of the wafer W and carrying in and the scrub line of a wafer may go into predetermined accuracy, XY axis. The prober part provided with the stage 5 which comprises the X stage and Y stage for moving the alignment part 3 provided with the pattern recognition means of the optical system for amending or an ITV camera, and the wafer chuck 4 and the wafer chuck 4 which are wafer support means to an XY direction is comprised, The transportation arm which is not illustrated is provided between the automatic–loader–and–unloader part 2 and the prober part.

The wafer W between the cassette 6 laid in the loader and the wafer chuck 4 of a prober part is exchanged.

In addition, a microscope for a probe device to view contact with the navigational panel and the wafer W which are not illustrated, and a probe needle, Based on the data of input data, such as a measuring condition, the alignment data at the time of measurement, etc., a predetermined operation is performed from a navigational panel, and it has the microcomputer (henceforth a microcomputer) for sending out a control signal to each actuator, such as a stage, etc.

[0012]It has a power supply for impressing predetermined voltage to the predetermined pad of the formed IC chip on a wafer, and a circuit, and is being fixed to the support arm 8 pivoted by the buck 7, and the test head 1 is movable at the measuring point on a main part which is illustrated from the retreating position at the time of non measurement. In order to support the weight of the test head 1, the clamp holding the end of the test head 1, etc. may be provided in the main part side of a probe

device. In order to prevent heating by the voltage impressing at the time of measurement to a test head, it has the cooling method which is not illustrated, but since the cooling fan conventionally used as a cooling method produces vibration, it is preferred that it is a cooling method by circulation of refrigerants, such as air, water, liquid nitrogen, and Freon.

[0013]The probe card 9 in which the predetermined electric conduction pattern was formed in the field by the side of the main part in the measuring point of such a test head 1 is directly fixed by screw ** etc., and the electrode and electric conduction pattern by the side of a test head are electrically connected. It is allocated by the probe card 9 so that two or more probe needles 9a electrically connected with the electric conduction pattern as shown in drawing 2 may project from the central opening 9c. If this probe needle 9a is formed corresponding to an inspected object, for example, it is a number corresponding to the pad of a chip, and arrangement if it is measurement of a single chip, and it is a multi probe, a probe needle will be allocated in the number corresponding to each pad of two or more chips, and arrangement. parallel appearance is carried out beforehand and the flat surface formed by the tip of the probe needle 9a which projects from the opening 9c, and the undersurface (field which counters a wafer) of the probe card 9 are carried out so that it may become parallel mutually. The target mark 9b for the compensation means of a probe part mentioned later to detect inclination is given to the undersurface of the probe card 9. The target mark 9b is formed in plurality, for example, four corners of the probe card 9, in an X axial direction at two ($9b_1$, $9b_2$) and two Y shaft orientations.

[0014]As for the main part 10 of a probe device, and the test head 1, in order to prevent change of the contact resistance of the probe needle 9a by vibration and the pad of a chip by the operation of a stage, etc., being installed on a vibration isolation system, respectively is preferred. On the other hand, the alignment part 3 and the probe part 4, As shown in drawing 3, ITV camera 12 for detecting the position of the chip on a wafer currently formed and the electrostatic capacity type sensor 13 for detecting the height of a wafer surface etc. are being fixed to the alignment bridge 11 as the alignment part 3. The stage 5 comprises the movable Y stage 5b in the direction of X along with two rails which extend this movable in direction of X X stage 5a, and X stage 5a top in the direction of Y along with two rails which extend in the direction of X.

X stage 5a and the Y stage 5b can move in the direction of X, and the direction of Y free with the drive mechanism of the common use containing a pulse motor etc. in the inside of the level surface.

[0015]It is fixed to the placing board 41 which carries out adsorption support with a vacuum absorption mechanism, and the Y stage 5b, and the wafer chuck 4 can go up and down the wafer W free in the up-and-down (Z) direction according to a conventional rising and falling mechanism, as further shown in drawing 4, and. Through the center, by a conventional rolling mechanism around a center line parallel to the Z-axis The flexible region 42 pivotable free, the bottom of the placing board 41 with which the supporter 43 which connects the flexible region 42 with the placing board 41 was comprised, and the supporter 43 was formed spherically -- two or more points (a of drawing 5 (b).), for example, three points It has composition supported by the member to which support length, such as a ball screw, a piezoelectric element, a cam, or an air cylinder, can be separately changed in b and c. That is, when the supporter 43 comprises three ball screws, it is made to change for every point which rotates a ball screw individually with a stepping motor etc., and supports the interval (henceforth support length) of the placing board 41 and the flexible region 42 with a ball screw, and the angle of the placing board 41 is changed. When the supporter 43 comprises three piezoelectric elements, the strength of the voltage impressed to each piezoelectric element is changed, the support length of each supporting point is changed, and the angle of the upper surface of the placing board 41 is changed. In addition, the ant etc. with which wedge-shaped heights were made to engage so that a slide is possible are employable as a cam, an air cylinder, or a tapered shape crevice as a method to which an angle is changed as mentioned above.

[0016]Furthermore, the electrostatic capacity sensor (height sensor) or CCD camera 14 for detecting inclination of the wafer chuck 4 to the probe card 9 is being fixed to the Y stage 5b by detecting the height to the target mark 9b of the probe card 9. For example, in the case of CCD camera 14, it is detected with the amount of autofocus adjustments of a camera that height h_1 to the target mark 9b mentions later. This CCD camera 14 has a target mark for itself, and that position is detectable in the

alignment part 3.
[0017]Next, operation of the probe device in such composition is explained. First, if the wafer W is held by a transportation arm from the loader section 2 at the placing board 41 of the wafer chuck 4, Move the wafer chuck 4 to the alignment bridge 11 by XY stage 5, and the position of the chip in which it is formed on the wafer by ITV camera 12 in accordance with the conventional method is detected, While making it the orthogonality of XY axis and a scrub line go into predetermined accuracy, an X-axis Y-axis is amended so that the pad of the probe needle 9a and a chip may be in agreement based on the parameter set beforehand.
[0018]Subsequently, the distance (initial position) from the center of the wafer W held based on the target mark of CCD camera 14 by ITV camera 12 at the wafer chuck 4 to CCD camera 14 is decided. The stage 5 is moved to after an appropriate time, and CCD camera 14 detects the height of target mark $9b_1$ provided in the both ends of the direction of X of the probe card 9, and $9b_2$ one by one. This height h_1 is calculated based on the amount of autofocus adjustments when color definition of the image of the target mark 9b in CCD camera 14 is made into the maximum as distance l_1 from a camera focus to the target mark 9b with the microcomputer built in. Height h_1 of two points corresponding to the two target marks 9b of the direction of X, Calculate h_2 and then distance d_1 of the direction of X for two points is calculated as a difference of the movement magnitude from the initial position of CCD camera 14, Inclination $theta_1$ of the direction of X can be calculated by following formula $tantheta_1$[from these height h_1, h_2, and distance d_1] $=(h_2-h_1)/d_1$ (drawing 5 (a)). Height h_3 of two points corresponding to the two target marks 9b which similarly were provided in the both ends of the direction of Y of a probe card also about the direction of Y, h_4 can be calculated and inclination $theta_2$ of the direction of Y can be calculated by formula $tantheta_2$[of the direction of Y for two points / from distance d_2] $=(h_2-h_1)/d_2$. Here, the inclination called for is relative inclination of the probe card 9 to the Y stage 5b 41, i.e., a placing board.
It does not interfere, even if either is level, and even when both receive horizontally and lean.

[0019]Next, to inclination of the probe card 9 calculated in this way, a microcomputer drives the predetermined ball screw or piezoelectric element of the supporter 43 so that inclination of the placing board 41 may be coincided, and it changes the support length of each supporting point. For example, in making the placing board 41 incline along with a Y-axis as shown in drawing 5 (b) noting that the supporting point (three points) a, b, and c is symmetrically arranged to the Y-axis, only tales doses change simultaneously the support length of the supporting points b and c of others [length / of the supporting point a on a Y-axis / support]. In making it incline along an X axial direction, while carrying out specified quantity change of one support length of the supporting points b and c, only the amount of halves of the movement magnitude changes the support length of the supporting point a. Thereby, parallel in the placing board 41 and the probe card 9 are secured, and the flat surface which the probe needle 9a forms, and the flat surface of a wafer become parallel. The ball screw of these supporters 43 or the movement magnitude of a piezoelectric element, Although it may carry out for every Y shaft orientations with an X axial direction, the contrast table of the movement magnitude of three points to inclination to an XY direction is created beforehand, this is inputted to the memory of the microcomputer, and inclination of the placing board 41 can be changed by the drive of the once of the supporter 43 based on this contrast table.
[0020]Thus, after parallel in the placing board 41 and the probe card 9 were secured, The stage 5 is moved in accordance with a conventional method, the wafer chuck 4 is again moved to the alignment bridge 11, the electrostatic capacity type sensor 13 detects the height of a wafer surface etc. further, and the movement magnitude of card Z shaft orientations is determined that a chip and the probe needle 9a will contact by suitable contact pressure. The movement magnitude of X which changed with inclinations, and the direction of Y is also amended.
[0021]Move the stage 5 to after an appropriate time, and the wafer chuck 4 is moved to it at a probe part, Raise the placing board 41 and a wafer and the probe needle 9a are made to approach, the pad of a chip and alignment of the direction of XYZtheta of the probe needle 9a are performed, observing with a microscope, a TV camera, etc., and the probe needle 9a and a pad are contacted after that.

Subsequently, electric measurement of one chip or two or more chips is carried out simultaneously, and a quality is judged by the circuit tester connected to the test head 1.

[0022]Although the above example explained what is called a level prober with level field and probe card in which an inspected object is laid, The probe device of this invention holds an inspected object vertically, and can apply it also to what is called a vertical probe device to which move horizontally and that an inspected object is made to approach to the test head 1. Since a vertical probe device fixes a test head with large weight by enlargement and he is trying to move the inspected object side, it can abolish contact with the probe needle and pad resulting from support of a test head being unstable, and is advantageous. Also in this case, by fixing a probe card to a test head directly, terminal areas, such as a major ring cable, can be lost and stabilization of an inspection can be attained.

[0023]In the above example, although the semiconductor wafer was explained as an inspected object, it cannot be overemphasized that this invention probe device is applicable to a LCD glass substrate etc.

[0024]

[Effect of the Invention]Since the inclination of an inspected object to a probe card can be amended according to the probe device of this invention so that clearly also from the above explanation, the loose connection by gap of inclination of both, such as an assembly error, is prevented, and highly precise measurement can be performed. Since a probe card can be directly attached to a test head by establishing a compensation means, terminal areas, such as a major ring cable between a test head and a probe card, can be lost, the increase in impedance is abolished, and exact high-frequency measurement becomes possible.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1]The entire configuration figure showing one example of the probe device of this invention.
[Drawing 2]The figure showing one example of the probe card concerning this invention.
[Drawing 3]The perspective view showing the important section of the probe device of drawing 1.
[Drawing 4]The figure showing another important section of the probe device of drawing 1.
[Drawing 5]With the figure explaining operation of the probe device of drawing 1, as for (a), (b) is a figure showing the inclination theta of a probe card, and a figure showing support of a placing board.
[Drawing 6]The figure showing the conventional probe device.
[Description of Notations]
1 ..... Test head
4 ..... Support means (wafer chuck)
43 ..... Compensation means (supporter)
5 ..... Stage
9 ..... Probe card
9a ..... Probe needle
14 ..... Compensation means (camera)
W ..... Inspected object (wafer)

[Translation done.]

* NOTICES *

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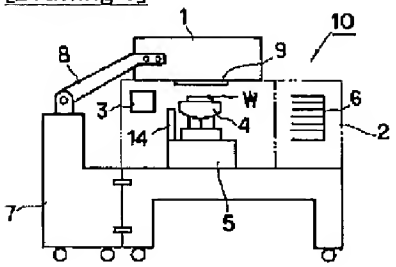
damages caused by the use of this translation.

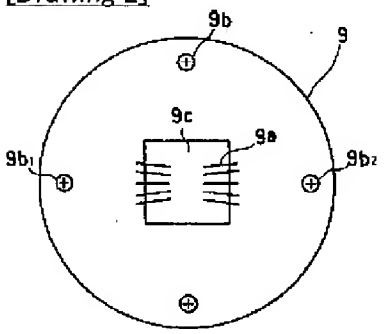
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

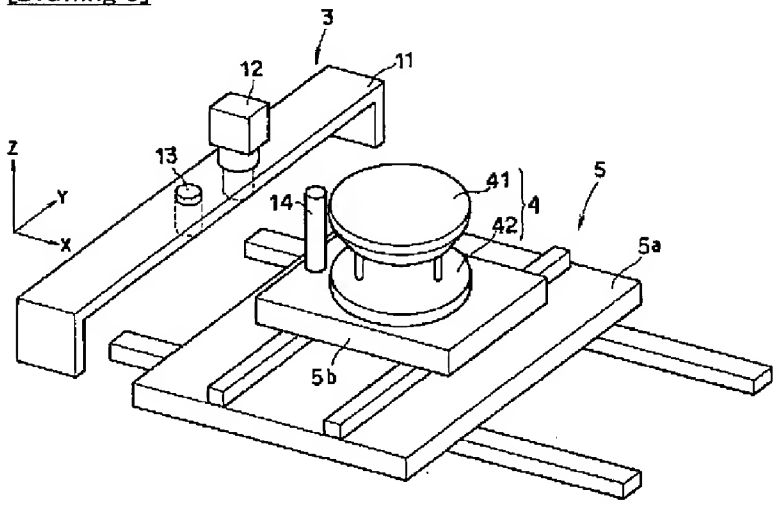
[Drawing 1]



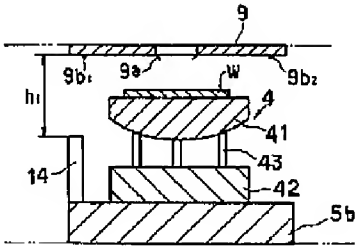
[Drawing 2]



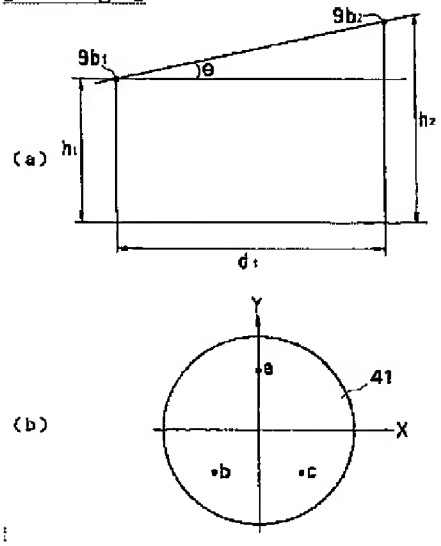
[Drawing 3]



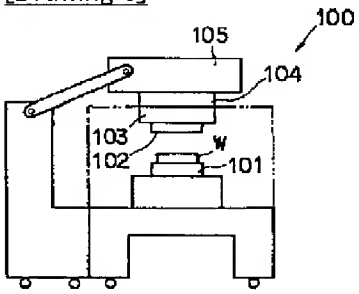
[Drawing 4]



[Drawing 5]



[Drawing 6]



[Translation done.]

CORRECTION OR AMENDMENT

[Kind of official gazette]Printing of amendment by the regulation of 2 of Article 17 of Patent Law
[Section classification] The 2nd classification of the part VII gate
[Publication date]April 23, Heisei 11 (1999)

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[FI]

H01L 21/66 B

G01R 1/073 E
[Written amendment]
[Filing date]October 16, Heisei 9
[Amendment 1]
[Document to be Amended]Specification
[Item(s) to be Amended]Whole sentence
[Method of Amendment]Change
[Proposed Amendment]
[Document Name]Specification
[Title of the Invention]Probe device
[Claim(s)]
[Claim 1]A test head and a probe card which is provided with a probe needle for inspecting an inspected object, and is electrically connected to said test head, In a probe device provided with a support means which supports said inspected object, and a stage for moving said support means so that said inspected object and said probe needle may contact,
A probe device provided with a compensation means which amends relative inclination between probe cards connected to said inspected object supported by said support means and said test head.
[Claim 2]The probe device according to claim 1, wherein said probe card is being directly fixed to said test head.
[Detailed Description of the Invention]
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[Industrial Application]This invention relates to the probe device for inspecting the electrical property of inspected objects, such as a semiconductor wafer.
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[Objects of the Invention]This invention was made that the above problems should be solved and an object of this invention is to provide the probe device in which the alignment of a processed object to a test head is possible at the time of measurement. By attaching a probe card to a test head directly, an object of this invention is to make a terminal area into the minimum and to raise the accuracy of high-frequency measurement.

[0009]

[Means for Solving the Problem]In order to attain such a purpose a probe device of this invention. A test head and a probe card which is provided with a probe needle for inspecting an inspected object, and is electrically connected to a test head. In a probe device provided with a support means which supports an inspected object, and a stage for moving a support means so that an inspected object and a probe needle may contact, It has a compensation means which amends relative inclination between probe cards connected to an inspected object supported by support means and a test head.

[0010]Suitably, a probe card is being directly fixed to a test head.
[0011]
[Function]A support means is moved by movement of a stage and an inspected object and the probe card attached to the test head are made to counter. While the compensation means provided in the support means here detects the inclination of an inspected object to a probe card, the inclination of an inspected object is amended so that a probe card and an inspected object may become parallel. YX drive of a support means and movement of a Z direction by movement of a stage are performed after an appropriate time with a conventional method, a probe needle is contacted on an inspected object, voltage is impressed to a predetermined pad by a test head, and an electrical property is measured.
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[Example]Hereafter, one example of the probe device of this invention is described with reference to drawings. Drawing 1 is a figure showing the whole probe device of this invention, and comprises the test head 1 mainly supported by buck 7 with another main part 10 of a probe device and main part. The cassette 6 by which the main part 10 of a probe device stores two or more semiconductor wafer W as an inspected object is laid, theta axis is doubled so that the orthogonality of the automatic-loader-and-unloader part 2 for performing taking out of the wafer W and carrying in and the scrub line of a wafer may go into predetermined accuracy, XY axis. The prober part provided with the stage 5 which comprises the X stage and Y stage for moving the alignment part 3 provided with the pattern recognition means of the optical system for amending or an ITV camera, and the wafer chuck 4 and the wafer chuck 4 which are wafer support means to an XY direction is comprised. The transportation arm which is not illustrated is provided between the automatic-loader-and-unloader part 2 and the prober part.
The wafer W between the cassette 6 laid in the loader and the wafer chuck 4 of a prober part is exchanged.
In addition, a microscope for a probe device to view contact with the navigational panel and the wafer W which are not illustrated, and a probe needle, Based on the data of input data, such as a measuring condition, the alignment data at the time of measurement, etc., a predetermined operation is performed from a navigational panel, and it has the microcomputer (henceforth a microcomputer) for sending out a control signal to each actuator, such as a stage, etc.
[0013]It has a power supply for impressing predetermined voltage to the predetermined pad of the formed IC chip on a wafer, and a circuit, and is being fixed to the support arm 8 pivoted by the buck 7, and the test head 1 is movable at the measuring point on a main part which is illustrated from the retreating position at the time of non measurement. In order to support the weight of the test head 1, the clamp holding the end of the test head 1, etc. may be provided in the main part side of a probe device. In order to prevent heating by the voltage impressing at the time of measurement to a test head, it has the cooling method which is not illustrated, but since the cooling fan conventionally used as a cooling method produces vibration, it is preferred that it is a cooling method by circulation of refrigerants, such as air, water, liquid nitrogen, and Freon.
[0014]The probe card 9 in which the predetermined electric conduction pattern was formed in the field by the side of the main part in the measuring point of such a test head 1 is directly fixed by screw ** etc., and the electrode and electric conduction pattern by the side of a test head are electrically connected. It is allocated by the probe card 9 so that two or more probe needles 9a electrically connected with the electric conduction pattern as shown in drawing 2 may project from the central opening 9c. If this probe needle 9a is formed corresponding to an inspected object, for example, it is a number corresponding to the pad of a chip, and arrangement if it is measurement of a single chip, and it is a multi probe, a probe needle will be allocated in the number corresponding to each pad of two or more chips, and arrangement. parallel appearance is carried out beforehand and the flat surface formed by the tip of the probe needle 9a which projects from the opening 9c, and the undersurface (field which counters a wafer) of the probe card 9 are carried out so that it may become parallel mutually. The target mark 9b for the compensation means of a probe part mentioned later to detect inclination is given to the undersurface of the probe card 9. The target mark 9b is formed in plurality, for example, four corners of the probe card 9, in an X axial direction at two (nine b1, nine b2) and two Y shaft orientations.
[0015]As for the main part 10 of a probe device, and the test head 1, in order to prevent change of the contact resistance of the probe needle 9a by vibration and the pad of a chip by the operation of a

stage, etc., being installed on a vibration isolation system, respectively is preferred. On the other hand, the alignment part 3 and the probe part 4, As shown in drawing 3, ITV camera 12 for detecting the position of the chip on a wafer currently formed and the electrostatic capacity type sensor 13 for detecting the height of a wafer surface etc. are being fixed to the alignment bridge 11 as the alignment part 3. The stage 5 comprises the movable Y stage 5b in the direction of X along with two rails which extend this movable in direction of X X stage 5a, and X stage 5a top in the direction of Y along with two rails which extend in the direction of X.
X stage 5a and the Y stage 5b can move in the direction of X, and the direction of Y free with the drive mechanism of the common use containing a pulse motor etc. in the inside of the level surface.

[0016]It is fixed to the placing board 41 which carries out adsorption support with a vacuum absorption mechanism, and the Y stage 5b, and the wafer chuck 4 can go up and down the wafer W free in the up-and-down (Z) direction according to a conventional rising and falling mechanism, as further shown in drawing 4, and. Through the center, by a conventional rolling mechanism around a center line parallel to the Z-axis The flexible region 42 pivotable free, the bottom of the placing board 41 with which the supporter 43 which connects the flexible region 42 with the placing board 41 was comprised, and the supporter 43 was formed spherically — two or more points (a of drawing 5 (b).), for example, three points It has composition supported by the member to which support length, such as a ball screw, a piezoelectric element, a cam, or an air cylinder, can be separately changed in b and c. That is, when the supporter 43 comprises three ball screws, it is made to change for every point which rotates a ball screw individually with a stepping motor etc., and supports the interval (henceforth support length) of the placing board 41 and the flexible region 42 with a ball screw, and the angle of the placing board 41 is changed. When the supporter 43 comprises three piezoelectric elements, the strength of the voltage impressed to each piezoelectric element is changed, the support length of each supporting point is changed, and the angle of the upper surface of the placing board 41 is changed. In addition, the ant etc. with which wedge-shaped heights were made to engage so that a slide is possible are employable as a cam, an air cylinder, or a tapered shape crevice as a method to which an angle is changed as mentioned above.
[0017]Furthermore, the electrostatic capacity sensor (height sensor) or CCD camera 14 for detecting inclination of the wafer chuck 4 to the probe card 9 is being fixed to the Y stage 5b by detecting the height to the target mark 9b of the probe card 9. For example, in the case of CCD camera 14, it is detected with the amount of autofocus adjustments of a camera that the height h1 to the target mark 9b mentions later. This CCD camera 14 has a target mark for itself, and that position is detectable in the alignment part 3.
[0018]Next, operation of the probe device in such composition is explained. First, if the wafer W is held by a transportation arm from the loader section 2 at the placing board 41 of the wafer chuck 4, Move the wafer chuck 4 to the alignment bridge 11 by XY stage 5, and the position of the chip in which it is formed on the wafer by ITV camera 12 in accordance with the conventional method is detected, While making it the orthogonality of XY axis and a scrub line go into predetermined accuracy, an X-axis Y-axis is amended so that the pad of the probe needle 9a and a chip may be in agreement based on the parameter set beforehand.
[0019]Subsequently, the distance (initial position) from the center of the wafer W held based on the target mark of CCD camera 14 by ITV camera 12 at the wafer chuck 4 to CCD camera 14 is decided. The stage 5 is moved to after an appropriate time, and CCD camera 14 detects the target mark nine b1 provided in the both ends of the direction of X of the probe card 9, and the height of nine b2 one by one. This height h1 is found based on the amount of autofocus adjustments when color definition of the image of the target mark 9b in CCD camera 14 is made into the maximum as the distance l1 from a camera focus to the target mark 9b with the microcomputer built in. The height h1 of two points corresponding to the two target marks 9b of the direction of X and h2 are calculated, then, the distance d1 of the direction of X for two points is found as a difference of the movement magnitude from the initial position of CCD camera 14, and it is a following formula from these height h1, h2, and the distance d1.
$$\tan\theta_1=(h_2-h_1)/d_1$$
It can be alike and can ask for the inclination theta 1 of the direction of X more (drawing 5 (a)).
Similarly the height h3 of two points corresponding to the two target marks 9b provided in the both ends of the direction of Y of a probe card also about the direction of Y and h4 are calculated, and it

is a formula from the distance d2 of the direction of Y for two points.
tantheta2=(h2-h1)/d2
It can be alike and can ask for the inclination theta 2 of the direction of Y more. Here, the inclination called for is relative inclination of the probe card 9 to the Y stage 5b 41, i.e., a placing board.
It does not interfere, even if either is level, and even when both receive horizontally and lean.

[0020]Next, to inclination of the probe card 9 calculated in this way, a microcomputer drives the predetermined ball screw or piezoelectric element of the supporter 43 so that inclination of the placing board 41 may be coincided, and it changes the support length of each supporting point. For example, in making the placing board 41 incline along with a Y-axis as shown in drawing 5 (b) noting that the supporting point (three points) a, b, and c is symmetrically arranged to the Y-axis, only tales doses change simultaneously the support length of the supporting points b and c of others [length / of the supporting point a on a Y-axis / support]. In making it incline along an X axial direction, while carrying out specified quantity change of one support length of the supporting points b and c, only the amount of halves of the movement magnitude changes the support length of the supporting point a. Thereby, parallel in the placing board 41 and the probe card 9 are secured, and the flat surface which the probe needle 9a forms, and the flat surface of a wafer become parallel. The ball screw of these supporters 43 or the movement magnitude of a piezoelectric element, Although it may carry out for every Y shaft orientations with an X axial direction, the contrast table of the movement magnitude of three points to inclination to an XY direction is created beforehand, this is inputted to the memory of the microcomputer, and inclination of the placing board 41 can be changed by the drive of the once of the supporter 43 based on this contrast table.
[0021]Thus, after parallel in the placing board 41 and the probe card 9 were secured, The stage 5 is moved in accordance with a conventional method, the wafer chuck 4 is again moved to the alignment bridge 11, the electrostatic capacity type sensor 13 detects the height of a wafer surface etc. further, and the movement magnitude of card Z shaft orientations is determined that a chip and the probe needle 9a will contact by suitable contact pressure. The movement magnitude of X which changed with inclinations, and the direction of Y is also amended.
[0022]Move the stage 5 to after an appropriate time, and the wafer chuck 4 is moved to it at a probe part, Raise the placing board 41 and a wafer and the probe needle 9a are made to approach, the pad of a chip and alignment of the direction of XYZtheta of the probe needle 9a are performed, observing with a microscope, a TV camera, etc., and the probe needle 9a and a pad are contacted after that. Subsequently, electric measurement of one chip or two or more chips is carried out simultaneously, and a quality is judged by the circuit tester connected to the test head 1.
[0023]Although the above example explained what is called a level prober with level field and probe card in which an inspected object is laid, The probe device of this invention holds an inspected object vertically, and can apply it also to what is called a vertical probe device to which move horizontally and that an inspected object is made to approach to the test head 1. Since a vertical probe device fixes a test head with large weight by enlargement and he is trying to move the inspected object side, it can abolish contact with the probe needle and pad resulting from support of a test head being unstable, and is advantageous. Also in this case, by fixing a probe card to a test head directly, terminal areas, such as a major ring cable, can be lost and stabilization of an inspection can be attained.
[0024]In the above example, although the semiconductor wafer was explained as an inspected object, it cannot be overemphasized that this invention probe device is applicable to a LCD glass substrate etc.
[0025]
[Effect of the Invention]Since the inclination of an inspected object to a probe card can be amended according to the probe device of this invention so that clearly also from the above explanation, the loose connection by gap of inclination of both, such as an assembly error, is prevented, and highly precise measurement can be performed. Since a probe card can be directly attached to a test head by establishing a compensation means, terminal areas, such as a major ring cable between a test head and a probe card, can be lost, the increase in impedance is abolished, and exact high-frequency measurement becomes possible.
[Brief Description of the Drawings]
[Drawing 1]The entire configuration figure showing one example of the probe device of this invention.

[Drawing 2]The figure showing one example of the probe card concerning this invention.
[Drawing 3]The perspective view showing the important section of the probe device of drawing 1.
[Drawing 4]The figure showing another important section of the probe device of drawing 1.
[Drawing 5]With the figure explaining operation of the probe device of drawing 1, as for (a), (b) is a figure showing the inclination theta of a probe card, and a figure showing support of a placing board.
[Drawing 6]The figure showing the conventional probe device.
[Description of Notations]
1 ... Test head
4 ... Support means (wafer chuck)
43 ... Compensation means (supporter)
5 ... Stage
9 ... Probe card
9a ... Probe needle
14 ... Compensation means (camera)
W ... Inspected object (wafer)

[Translation done.]

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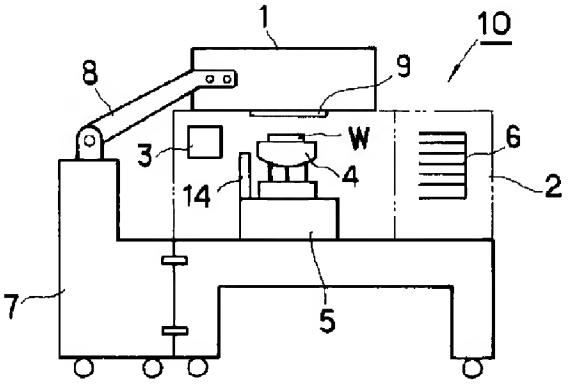
(54)【発明の名称】　プローブ装置

(57)【要約】
【目的】　測定時にテストヘッドに対する被処理体の位置合わせが可能で、高精度の高周波測定が可能であるプローブ装置を提供する。
【構成】　テストヘッド１に直接プローブ針を備えたプローブカード９を取り付けるとともに、被検査体を支持する載置台４に載置台４に対するプローブカード９の傾きを検出する検出手段１４を取り付けるとともに、この検出手段１４からの情報に基づき載置台４の傾きを補正する補正手段を設ける。補正手段は載置台４を支持する長さが変化可能な３本の支持部から成り、各支持部の長さを変えることにより載置台４の傾きを補正する。
【効果】　テストヘッドに直接プローブカードを取り付けることができるので、テストヘッドとプローブカードとの間のメジャーリングケーブル等接続部をなくすことができ、インピーダンスの増加をなくし、正確な高周波測定が可能となる。



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【特許請求の範囲】

【請求項１】テストヘッドと、被検査体を検査するためのプローブ針を備え、前記テストヘッドに電気的に接続されるプローブカードと、前記被検査体を支持する支持手段と、前記支持手段を前記被検査体と前記プローブ針とが接触するように移動するためのステージとを備えたプローブ装置において、前記支持手段は前記被検査体の前記テストヘッドに対する傾きを補正する補正手段を備えたことを特徴とするプローブ装置。

【請求項２】前記プローブカードは前記テストヘッドに固定的に連結されていることを特徴とする請求項１記載のプローブ装置。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】この発明は、半導体ウェハ等被検査体の電気的特性を検査するためのプローブ装置に関する。

【０００２】

【従来の技術】被検査体、例えば被検査体の表面には一定間隔で規則的に配列された複数のチップが形成され、各チップ内の所定の箇所にはこのチップ内の各種の信号機に連なる複数のパッドが形成される。チップ内の各パッドに検査装置の対応のプローブ針を接触させた状態でこのチップの電気的特性の検査が行なわれ、不良チップに対してはマーキングなどによる識別が行なわれる。通常、この主の検査装置は検査の自動化を図るためにプローブ装置が組み合わされる。

【０００３】このプローブ装置１００は、図６に示すようにＸ、Ｙ、Ｚ、θ方向に移動可能なウェハ載置台１０１の上方側にウェハ内のＩＣチップの電極パッド配列に対応して配列されたプローブ針を備えたプローブカード１０２を配置するとともに、このプローブカード１０２を例えばネジによりコンタクトリング１０３の下面に固定してコンタクトリング１０３とプローブカードとをメジャーリングケーブル或いはコンタクトリング１０３のポゴピンを介して電気的に接続し、更にこのコンタクトリングをプローブ装置本体のインサートリング１０４に図示しない固定手段により固定して構成される。そしてこのような装置におけるプローブテストは、テストヘッド１０５をコンタクトリング１０３の上面に押し当ててメジャーリングケーブル或いはポゴピンによりテストヘッド１０５とコンタクトリング１０３とを電気的に接続し、ウェハ載置台１０１を上昇させてプローブ針とウェハ内のチップの電極パッドとを接触させ、この状態で電気的測定を行なってＩＣチップの良否を判断するようにしている。

【０００４】さらに最近では、稼働率の向上のために複数、例えば１６のＩＣチップをこれらＩＣチップに対応するプローブ針を備えたプローブカードによって一度に測定するマルチプローブも行なわれている。

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【０００５】

【発明が解決しようとする課題】ところでこのような従来のプローブ装置においては、被検査体であるＩＣチップとテストヘッドとの間にメジャーリングケーブル或いはポゴピンといった複数の接続部が介在するため、容量、インピーダンスが増大し、２００～３００ＭＨｚ以上の高周波検査を正確に行なえないという問題がある。またＩＣチップとテストヘッド１０５とのマッチングをとることが難しく、測定が安定しにくいという問題がある。

【０００６】このためテストヘッドに直接プローブカードを固定し、接続部を最小にするとことが考えられる。しかし、一般にテストヘッドとプローブ装置本体とはそれぞれ別個の台上にあり、それらの水平が異なるため、テストヘッドに直接プローブカードを固定した場合には、プローブ針をＩＣチップに位置合わせしても完全なコンタクトを図ることができないので、プローブカードの水平面とウェハの水平面とを一致させる調整が必要となる。

【０００７】従来のプローブ装置においても、装置の組立時にプローブカードが取り付けられる面とウェハ載置台との水平出し作業は行なわれるが、この場合例えば１個のチップを測定するシングルプローブでは、水平度が数１０ミクロンの精度が、また複数のチップを一度に測定するマルチプローブではシングルの約倍の精度が要求される。しかし、テストヘッドは２００ｋｇ以上、特に高集積化の進んだ大径ウェハ用のテストヘッドでは３００～５００ｋｇにもなり、しかもテストヘッドは剛性のある支持手段に支持されていないため、振動があると位置ずれを生じる可能性が大きく、組立時に高精度の水平出しを行なっても測定時には所望の精度を達成できない可能性がある。

【０００８】

【目的】本発明は、以上のような問題点を解決すべくなされたもので、測定時にテストヘッドに対する被処理体の位置合わせが可能であるプローブ装置を提供することを目的とする。更に本発明はテストヘッドに直接プローブカードを取り付けることにより、接続部を最小にして高周波測定の精度を上げることを目的とする。

【０００９】

【課題を解決するための手段】このような目的を達成する本発明のプローブ装置は、テストヘッドと、被検査体を検査するためのプローブ針を備え、テストヘッドに電気的に接続されるプローブカードと、被検査体を支持する支持手段と、支持手段を被検査体とプローブ針とが接触するように移動するためのステージとを備えたプローブ装置において、支持手段は前記被検査体のテストヘッドに対する傾きを補正する補正手段を備えたものであり、好適にはプローブカードがテストヘッドに固定的に連結されているものである。

【００１０】
【作用】ステージの移動によって支持手段を移動し、被検査体とテストヘッドに取り付けられたプローブカードとを対向させる。ここで支持手段に設けられた補正手段によりプローブカードに対する被検査体の傾きを検出するとともにプローブカードと被検査体とが平行となるように被検査体の傾斜を補正する。しかる後に常法によりステージの移動による支持手段のＹＸ駆動とＺ方向の移動を行ない被検査体にプローブ針を接触させて所定のパッドにテストヘッドにより電圧を印加し、電気的特性を測定する。
【００１１】
【実施例】以下、本発明のプローブ装置の１実施例を図面を参照して説明する。図１は本発明のプローブ装置の全体を示す図で、主としてプローブ装置本体１０と本体とは別の支持台７に支持されたテストヘッド１とから成る。プローブ装置本体１０は、被検査体として複数の半導体ウェハWを収納するカセット６が載置され、ウェハWの搬出、搬入を行なうためのローダ・アンローダ部２、ウェハのスクラブラインの直交性が所定の精度に入るようにθ軸を合わせ、ＸＹ軸を補正するための光学系或いはＩＴＶカメラ等のパターン認識手段を備えたアライメント部３、及びウェハ支持手段であるウェハチャック４とウェハチャック４をＸＹ方向に移動するためのＸステージとＹステージとから成るステージ５とを備えたプローバ部とから成り、ローダ・アンローダ部２とプローバ部との間には図示しない搬送アームが設けられており、ローダに載置されたカセット６とプローバ部のウェハチャック４との間のウェハWのやりとりを行なう。この他、プローブ装置は図示しない操作パネル、ウェハWとプローブ針との接触を目視するためのマイクロスコープ、操作パネルから測定条件等の入力データや測定時のアライメントデータ等のデータに基づき所定の演算を行ない、ステージ等の各駆動部に制御信号を送出するためのマイクロコンピュータ（以下、マイコンという）等が備えられている。
【００１２】テストヘッド１はウエハ上の形成されたＩＣチップの所定のパッドに所定の電圧を印加するための電源、回路を備え、支持台７に枢着された支持腕８に固定されており、非測定時の退避位置から図示するような本体上の測定位置に移動可能になっている。なお、テストヘッド１の重量を支えるためにプローブ装置本体側にテストヘッド１の一端を保持するクランプ等を設けてもよい。更に、テストヘッドには測定時の電圧印加による加熱を防止するために、図示しない冷却手段が備えられているが、冷却手段として従来用いられている冷却ファンは振動を生じるので、空気、水、液体窒素、フレオン等の冷媒の循環による冷却手段であることが好ましい。
【００１３】このようなテストヘッド１の測定位置における本体側の面には、所定の導電パターンが形成されたプローブカード９がネジ止等により直接固定され、テストヘッド側の電極と導電パターンとが電気的に接続されている。プローブカード９には図２に示すように導電パターンと電気的に接続された複数のプローブ針９ａが中央の開口９ｃから突出するように配設されている。このプローブ針９ａは被検査体に対応して設けられ、例えばシングルチップの測定であればチップのパッドに対応する数、配列で、またマルチプローブであれば複数のチップの各パッドに対応する数、配列でプローブ針が配設される。開口９ｃから突出するプローブ針９ａの先端によって形成する平面とプローブカード９の下面（ウェハに対向する面）とは互いに平行となるように予め平行出しされている。また、プローブカード９の下面には、後述するプローブ部の補正手段によって傾きを検出するためのターゲットマーク９ｂが附されている。ターゲットマーク９ｂは複数、例えばプローブカード９の４隅にＸ軸方向に２つ（$９ｂ_1$、$９ｂ_2$）、Ｙ軸方向に２つ設けられる。
【００１４】なお、プローブ装置本体１０とテストヘッド１は、ステージの作動等による振動によるプローブ針９ａとチップのパッドとの接触抵抗の変化を防止するために、それぞれ防振台上に設置されていることが好ましい。一方、アライメント部３及びプローブ部４は、図３に示すようにアライメント部３としてアライメントブリッジ１１にウェハ上の形成されているチップの位置を検出するためのＩＴＶカメラ１２と、ウェハ表面などの高さを検出するための静電容量型センサ１３が固定されている。ステージ５は、Ｘ方向に延在される２本のレールに沿ってＸ方向に移動可能なＸステージ５ａと、このＸステージ５ａ上をＹ方向に延在される２本のレールに沿ってＸ方向に移動可能なＹステージ５ｂとから構成されており、Ｘステージ５ａ及びＹステージ５ｂは、パルスモータなどを含む慣用の駆動機構によって水平面内をＸ方向とＹ方向とに自在に移動することができる。
【００１５】ウェハチャック４は更に図４に示すように、ウェハWを例えば真空吸着機構によって吸着支持する載置板４１と、Ｙステージ５ｂには固定され、慣用の昇降機構によって上下（Ｚ）方向に自在に昇降可能であると共に、その中心を通りＺ軸に平行な中心線の周りに慣用の回転機構によって自在に回転可能である可動部４２と、載置板４１と可動部４２を連結する支持部４３とから成り、支持部４３は球状に形成された載置板４１の底面を複数点例えば３点（図５（ｂ）のａ、ｂ、ｃ）においてボールネジ、圧電素子、カム或いはエアシリンダ等の支持長を別個に変化させることができる部材で支持する構成となっている。即ち、支持部４３が３本のボールネジで構成される場合にはステッピングモータ等によりボールネジを個別に回転させて載置板４１と可動部４２との間隔（以下、支持長という）をボールネジで支持する点毎に変化させて載置板４１の角度を変化させる。

また、支持部４３が３本の圧電素子から成る場合には、各圧電素子に印加する電圧の強さを変化させて、各支持点の支持長を変化させ、載置板４１の上面の角度を変化させる。その他、上述したように角度を変化させる方式としてカムやエアシリンダ或いはテーパ状凹部に楔状の凸部をスライド可能に係合させたアリ等を採用することができる。

【００１６】更にＹステージ５ｂにはプローブカード９のターゲットマーク９ｂまでの高さを検出することによってプローブカード９に対するウェハチャック４の傾きを検出するための静電容量センサ（ハイトセンサ）或いはＣＣＤカメラ１４が固定されている。例えばＣＣＤカメラ１４の場合、後述するようにカメラのオートフォーカス調整量によってターゲットマーク９ｂまでの高さh_1を検知する。このＣＣＤカメラ１４はそれ自身用のターゲットマークを有しており、アライメント部３においてその位置が検知可能になっている。

【００１７】次にこのような構成におけるプローブ装置の動作について説明する。まず、ローダ部２から搬送アームによってウェハWがウェハチャック４の載置板４１に保持されると、ＸＹステージ５によってウェハチャック４をアライメントブリッジ１１に移動させ、常法に従いＩＴＶカメラ１２によりウェハ上の形成されているチップの位置を検出して、ＸＹ軸とスクラブラインとの直交性が所定の精度に入るようにするとともに予め設定したパラメータを基にプローブ針９ａとチップのパッドが一致するようにＸ軸Ｙ軸を補正する。

【００１８】次いでＩＴＶカメラ１２によりＣＣＤカメラ１４のターゲットマークを基にウェハチャック４に保持されたウェハWの中心からＣＣＤカメラ１４までの距離（初期位置）を決める。しかる後に、ステージ５を移動させてＣＣＤカメラ１４がプローブカード９のＸ方向の両端に設けられたターゲットマーク９b_1、９b_2の高さを順次検知する。この高さh_1は、内蔵されるマイコンによってＣＣＤカメラ１４におけるターゲットマーク９ｂの映像の鮮明度を極大にしたときのオートフォーカス調整量に基づきカメラ焦点からターゲットマーク９ｂまでの距離l_1として求められる。Ｘ方向の２つのターゲットマーク９ｂに対応する２点の高さh_1、h_2を求め、次に２点間のＸ方向の距離d_1をＣＣＤカメラ１４の初期位置からの移動量の差として求め、これら高さh_1、h_2及び距離d_1から、次式

$$\tan\theta_1=(h_2-h_1)/d_1$$

により、Ｘ方向の傾きθ_1を求めることができる（図５（ａ））。同様に、Ｙ方向についてもプローブカードのＹ方向の両端に設けられた２つのターゲットマーク９ｂに対応する２点の高さh_3、h_4を求め、２点間のＹ方向の距離d_2から式

$$\tan\theta_2=(h_2-h_1)/d_2$$

によりＹ方向の傾きθ_2を求めることができる。ここで、求められる傾きは、Ｙステージ５ｂ、即ち載置板４１に対するプローブカード９の相対的傾きであり、どちらかが水平であっても、また両方とも水平方向に対して傾いている場合でも差し支えない。

【００１９】次にマイコンはこのように演算されたプローブカード９の傾きに対して、載置板４１の傾きを一致させるように支持部４３の所定のボールネジ若しくは圧電素子を駆動して、各支持点の支持長を変化させる。例えば、図５（ｂ）に示すように、支持点（３点）ａ、ｂ、ｃがＹ軸に対し対称に配置されているとして、載置板４１をＹ軸に沿って傾斜させる場合には、Ｙ軸上にある支持点ａの支持長のみ或いは他の支持点ｂ、ｃの支持長を同時に同量だけ変化させる。また、Ｘ軸方向に沿って傾斜させる場合には、支持点ｂ、ｃのいずれか一方の支持長を所定量変化させるとともに支持点ａの支持長をその移動量の半分量だけ変化させる。これにより、載置板４１とプローブカード９との平行が確保され、プローブ針９ａの形成する平面とウェハの平面とが平行になる。なお、これら支持部４３のボールネジ若しくは圧電素子の移動量は、Ｘ軸方向とＹ軸方向毎に行なってもよいが、予めＸＹ方向の傾きに対する３点の移動量の対照表を作成しこれをマイコンのメモリにインプットしておき、この対照表を基に支持部４３の一度の駆動で載置板４１の傾きを変えるようにすることもできる。

【００２０】このように載置板４１とプローブカード９との平行が確保された後、常法に従いステージ５を移動してウェハチャック４を再びアライメントブリッジ１１に移動し、さらに静電容量型センサ１３によりウェハ表面などの高さを検出し、チップとプローブ針９ａとが適切な接触圧でコンタクトするようにカードＺ軸方向の移動量を決定する。また、傾斜により変化したＸ、Ｙ方向の移動量も補正する。

【００２１】しかる後に、ステージ５を移動してウェハチャック４をプローブ部に移動し、載置板４１を上昇させてウェハとプローブ針９ａとを接近させ、マイクロスコープやＴＶカメラ等により観察しながらチップのパッドとプローブ針９ａのＸＹＺθ方向の位置合わせを行ない、その後プローブ針９ａとパッドとを接触させる。次いでテストヘッド１に接続されたテスタにより、１つのチップ或いは複数のチップが同時に電気的測定され、良否が判定される。

【００２２】なお、以上の実施例では、被検査体が載置される面とプローブカードとが水平であるいわゆる水平プローバについて説明したが、本発明のプローブ装置は被検査体を垂直に保持し、テストヘッド１に対して被検査体を水平方向に移動して接近させるいわゆる垂直プローブ装置にも適用できる。垂直プローブ装置は、大型化で重量の大きいテストヘッドを固定して、被検査体側を移動するようにしているので、テストヘッドの支持が不安定であることに起因するプローブ針とパッドとの接触

をなくすことができ、有利である。この場合にもテストヘッドに直接プローブカードを固定することにより、メジャーリングケーブル等接続部をなくすことができ、検査の安定化を図ることができる。

【００２３】また以上の実施例においては、被検査体として半導体ウェハについて説明したが、本発明プローブ装置はＬＣＤガラス基板等にも適用できることは言うまでもない。

【００２４】

【発明の効果】以上の説明からも明らかなように、本発明のプローブ装置によればプローブカードに対する被検査体の傾きを補正することができるので、組立誤差等の両者の傾きのずれによる接触不良を防止し、高精度の測定ができる。また、補正手段を設けることにより、テストヘッドに直接プローブカードを取り付けることができるので、テストヘッドとプローブカードとの間のメジャーリングケーブル等接続部をなくすことができ、インピーダンスの増加をなくし、正確な高周波測定が可能となる。

【図面の簡単な説明】

【図１】本発明のプローブ装置の一実施例を示す全体構成図。

【図２】本発明に係るプローブカードの一実施例を示す図。

【図３】図１のプローブ装置の要部を示す斜視図。

【図４】図１のプローブ装置の別の要部を示す図。

【図５】図１のプローブ装置の動作を説明する図で、（ａ）はプローブカードの傾斜θを示す図、（ｂ）は載置板の支持を示す図。

【図６】従来のプローブ装置を示す図。

【符号の説明】

１……テストヘッド

４……支持手段（ウェハチャック）

４３……補正手段（支持部）

５……ステージ

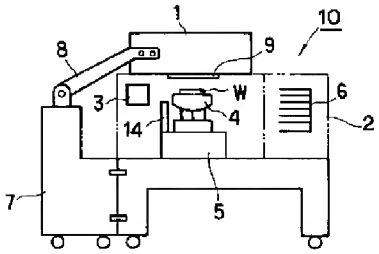
９……プローブカード

９ａ……プローブ針

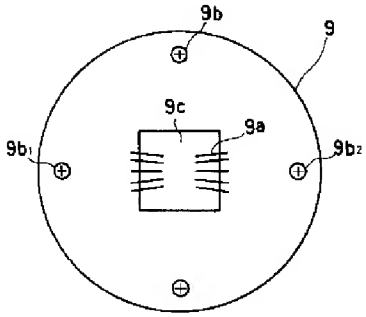
１４……補正手段（カメラ）

Ｗ……被検査体（ウェハ）

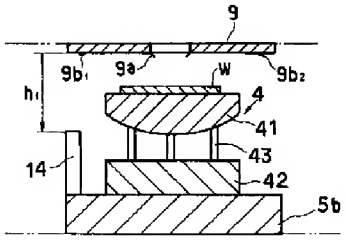
【図１】



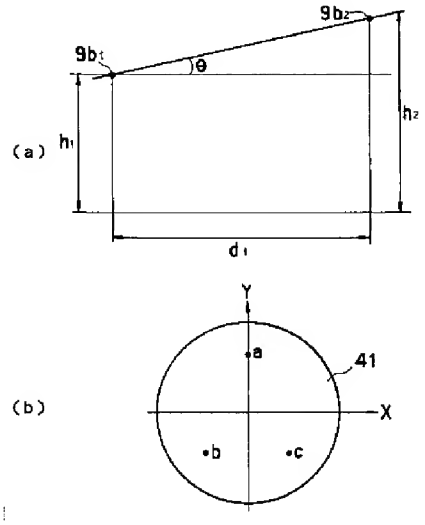
【図２】



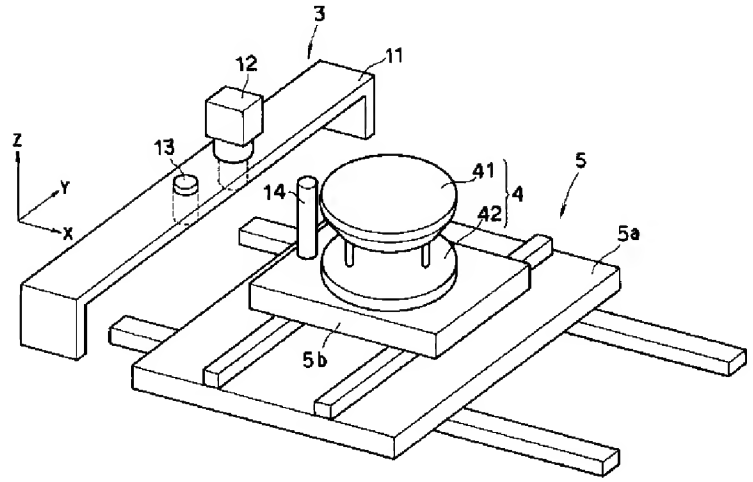
【図４】



【図５】



【図３】



【図６】